We claim

1. A method of depositing a cladding layer over external surfaces of a waveguide structure formed on a planar substrate, the waveguide structure comprising a planar waveguide core formed on the planar substrate and a raised structure formed on the planar substrate adjacent the waveguide core, the method comprising the steps of:
   - depositing a cladding material over the planar waveguide structure,
   - etching the deposited cladding material so as to reduce shadowing effects between the waveguide core and the raised structure during the deposition of the cladding material, and
   - controlling at least one parameter of the deposition so as to form a cladding layer from the deposited material.

2. A method as claimed in claim 1, wherein the cladding material is deposited and etched such that the resultant cladding layer is substantially free of macroscopic and microscopic voids.

3. A method as claimed in claim 1, wherein the raised structure comprises one in a group comprising a further planar waveguide core, a slab waveguide, a contact structure, a support structure, a processor structure, and an alignment structure.

4. A method as claimed in claim 1, wherein the step of etching comprises preferentially etching the deposited material at or near corners of the waveguide structure.

5. A method as claimed in claim 1, wherein the step of etching is conducted in a manner which reduces shadowing effects resulting from an accumulation of cladding material at or near respective opposed corners of the waveguide core and raised structure.

6. A method as claimed in claim 5, wherein the step of etching is conducted in a manner which reduces shadowing effects by removing overhanging structures extending from the corners of the waveguide core and raised structure, the overhanging structures resulting from a build-up of cladding material.

7. A method as claimed in claim 1, further comprising increasing a rate of the etching with increasing height of the waveguide core and/or the raised structure.

8. A method as claimed in claim 1, wherein the step of etching comprises ion bombarding the deposited cladding material so as to cause sputtering.

9. A method as claimed in claim 8, wherein the ions involved in the ion bombardment comprise argon (Ar) ions.

10. A method as claimed in claim 9, wherein the Ar ions are directed at an angle of substantially 90° to the substrate.

11. A method as claimed in claim 1, wherein the step of etching and the step of depositing the cladding material are conducted simultaneously.

12. A method as claimed in claim 1, wherein the step of etching and the step of depositing the cladding material are conducted sequentially.

13. A method as claimed in claim 1, wherein the step of etching is conducted in a manner which controls the energy of any cladding material which is etched away but subsequently re-deposited in the region between the waveguide core and the raised structure, whereby a material property of the material deposited in the region between the waveguide core and the raised structure is controlled.

14. A method as claimed in claim 1, wherein the step of depositing the cladding material comprises PECVD.

15. A method as claimed in claim 14, wherein the PECVD is conducted in the absence of nitrogen or nitrogen-containing gases, whereby optical absorption in the resulting cladding layer is reduced.

16. A method as claimed in claims 14, wherein the PECVD process is conducted such that the etching results from ion bombardment arising from the PECVD process.

17. A method as claimed in claim 14, wherein the PECVD process is conducted such that the etching results from ion bombardment arising from the PECVD process, and wherein the ion bombardment is controlled by controlling one or more deposition parameters in a group comprising: power input into the PECVD; frequency of a radio frequency (RF) power supply for the PECVD; power of one power supply in a dual-frequency power supply for the PECVD; substrate temperature; and argon-to-precursor vapour flow ratio during the PECVD.

18. A method as claimed in claim 14, wherein the PECVD process comprises utilising a liquid source for the precursor vapour.

19. A method as claimed in claim 1, wherein the step of depositing cladding material comprises depositing a gap-fill layer of the cladding material to substantially fill a gap between the waveguide core and the raised structure, and depositing an overlayer of cladding material over the gap-fill layer, the overlayer being deposited at a higher deposition rate than the gap-fill layer.

20. A method as claimed in claim 19, wherein the method further comprises a step of annealing the deposited cladding material to equalise the densities of cladding material deposited between the waveguide core and the raised structure ,and above the waveguide core.

21. A method as claimed in claim 1, wherein the method further comprises a step of doping the cladding layer with a refractive-index-modifying dopant during or after the deposition of the cladding material.

22. A method as claimed in claim 1, wherein the step of depositing cladding material comprises depositing a plurality of layers of cladding material, wherein at least one of the layers exhibits a compressive stress and the remaining layer(s) exhibits a tensile stress which at least partially compensates for the compressive stress.

23. A method as claimed in claim 22, wherein the cladding layer has substantially zero net stress.

24. A method as claimed in claim 11, wherein the cladding layer is formed with a predetermined stress by controlling the etching component during the deposition of the cladding material.

25. A method as claimed in claim 1, wherein the etching is conducted in a manner which prevents etching of the waveguide structure.

26. A method as claimed in claim 1, wherein the step of etching comprises etching portions of the waveguide structure at or near respective opposed corners of the waveguide core and raised structure.

27. A method as claimed in claim 1, wherein the steps of depositing and etching the cladding material are conducted in respective dedicated processing chambers.

28. A method as claimed in claim 1, wherein the substrate comprises an optical buffer layer formed on an underlying substrate wafer, for optically isolating the waveguide core from the substrate wafer.

29. A method as claimed in claim 1, wherein an aspect ratio of a region between the waveguide core and the raised structure is at least 0.5:1.

30. A method as claimed in claim 29, wherein the aspect ratio is at least 0.8:1.

31. A method of depositing a cladding layer over a waveguide structures formed on a planar substrate, the waveguide structure comprising a planar waveguide core formed on the planar substrate and a raised structure formed on the planar substrate adjacent the waveguide core, the method comprising the steps of:

- modifying cross-sectional shapes of the waveguide core and the raised structure,
- depositing a cladding material over external surfaces of the modified waveguide core and raised structure, and

- controlling at least one parameter of the deposition so as to form a cladding layer from the deposited cladding material,

wherein the cross-sectional shapes are modified such that there is a reduction in shadowing effects between the waveguide core and the raised structure during the deposition of the cladding material.

32. A method as claimed in claim 31, wherein the raised structure comprises one in a group comprising a further planar waveguide core, a slab waveguide, a contact structure, a support structure, a processor structure, and an alignment structure.

33. A method as claimed in claim 31, wherein the waveguide core and the raised structure are modified such that the resultant cladding layer is substantially free of macroscopic and microscopic voids.

34. A method as claimed in claim 31, wherein the waveguide core and the raised structure are modified such that at least portions of sidewalls of the modified waveguide core and the raised structure are sloped with respect to the substrate.

35. A method as claimed in claim 31, wherein the modified waveguide core has a generally-triangular cross-sectional shape.

36. A method as claimed in claim 31. wherein the step of modifying the cross-sectional shapes comprises preferentially etching the waveguide core and the raised structure at or near respective opposed corners of the waveguide core and the raised structure.

37. A method as claimed in claim 36, wherein the preferential etching is a result of ion bombardment.

38. A method as claimed in claim 36, wherein the preferential etching is a result of ion bombardment, and wherein the ions involved in the ion bombardment are directed at an angle of substantially 90° to the substrate.

39. A method as claimed in claim 31, wherein the substrate comprises an optical buffer layer formed on an underlying substrate wafer for optically isolating the waveguide core from the substrate wafer.

40. A method as claimed in claim 31, wherein an aspect ratio of a region between the original waveguide core and raised structure is at least 0.5:1.

41. A method as claimed in claim 31, wherein an aspect ratio of a region between the original waveguide core and raised structure is at least 0.8:1.

Sub a1

~~42. An optical component fabricated utilising a method as claimed in either claim 1 or claim 31.~~

~~43. An optical component assembly incorporating a component fabricated utilising a method as claimed in either claim 1 or claim 31.~~

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